CE162-19

IECC: C405.1, C405.1.1 (New), C405.1.2 (New)

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2018 International Energy Conservation Code

Revise as follows:

C405.1 General (Mandatory). ~~This section covers lighting~~ Lighting system controls, the maximum lighting power for interior and exterior applications and electrical energy consumption shall comply with this section. ~~*Dwelling units* within multifamily buildings shall comply with Section R404.1. All other *dwelling units* shall comply with Section R404.1, or with Sections C405.2.4 and C405.3. *Sleeping units* shall comply with Section C405.2.4, and with Section R404.1 or C405.3. Lighting installed in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with the lighting requirements of Section C403.10.1 or C403.10.2.~~

Add new text as follows:

C405.1.1 Lighting for dwelling units. No less than 90 percent of the permanently installed lighting serving dwelling units shall be provided by lamps with an efficacy of not less than 65 lm/W or luminaires with an efficacy of not less than 45 lm/W, or shall comply with Sections C405.2.4 and C405.3.

C405.1.2 Lighting for refrigerated applications. Lighting installed in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with the lighting requirements of Section C403.10.1 or C403.10.2.

Reason: The current language refers lighting in dwelling units to the lighting requirements in the residential section. The referenced residential code sections include a requirement that 90% of the lighting be provided by "high efficacy lamps." There are a handful of issues with the existing code requirements:

1. The definition of "high efficacy lamps" has not been updated to reflect the changes in the market due to increased federal minimums and greater availability/affordability of LED lighting. As a result the code has actually become less stringent as the baseline for lighting equipment is raised.
2. The categories in the definition of “high efficacy lamps” in the residential code is an artifact of incandescent and early compact fluorescent lamp wattages. As lamps have gotten more efficient, the higher wattage categories have become less meaningful. Even a “100W equivalent” LED lamp and “60W equivalent” CFL lamps generally uses 15W or less, which is the bottom category in the existing definition. As a result, the categories have become largely meaningless.
3. The definition is for high efficacy lamps. However, with the proliferation of LED lighting, the market is increasingly utilizing luminaires with integrated LEDs, which are not really lamps. This prevents this high-efficiency lighting solution from being used to meet the high efficacy requirement.

This proposal solves these problems by replacing the reference to the residential lamp efficacy requirements with built-in lighting requirements. Like the existing lighting requirement, this proposal would require that 90% of the lighting be provided by higher performance lighting, but it replaces the reference to “high efficacy lamps” with a built-in efficacy requirement. This requirement establishes minimums for both lamps and luminaires so that it is relevant to the current lighting market without the wattage bins that are no longer relevant to current technologies. The efficacy levels are widely available and are low enough that products with a wide array of color temperatures and CRIs can meet the requirement, providing lighting designers and customers with flexibility.

The proposal also structures the section for greater clarity. Requirements for dwelling unit lighting and refrigerated application have been somewhat shoe-horned into C405.1, leaving the section bloated and without focus. This proposal breaks the requirements for dwelling unit lighting and refrigerated applications into standalone sub-sections for greater clarity.

When modeled against IECC-2015 using the mid-rise and high-rise prototypes developed by Pacific Northwest National Lab for code determination studies, whole-building energy savings ranged from 0.1-0.5% and whole-building electricity savings ranged from 5.3-6.5%. While the 2018 IECC is not exactly the same baseline as 2015, the lighting requirements did not change and these results give a reasonable approximation of savings. Based on U.S. DOE studies, the cost savings by replacing all of the CFLs with higher efficacy LED lighting saves approximately $6 per year per dwelling unit in overall regulated energy costs.

Cost Impact: The code change proposal will increase the cost of construction
This change could potentially increase the cost of construction because it requires higher efficacy lighting (lamps and/or fixtures), which will likely eliminate some lower-end CFL options and/or push builders to newer LED technologies. However, the cost of LEDs has been steadily declining over the last several years and is expected to continue to decline. Based on an analysis by the U.S. Department of Energy's Building Energy Codes Program conducted during the 2018 IECC Code Development cycle, the estimated and projected prices for LEDs were $4.84 per lamp compared to CFLs at $3.10 per lamp. However, the rapid expansion of the LED lighting market has changed the economics. A spot check of Home Depot in early 2019 showed that a warm white, 60W equivalent A-lamp is as low as $1.24 for both CFL and LED when purchased in packs. And, LEDs are actually cheaper than CFLs at some sources. At 1000bulbs.com, on online retailer, the same lamps are $1.79/bulb for CFL and $0.99 for LED. Therefore, this code change may actually reduce the cost of construction.

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